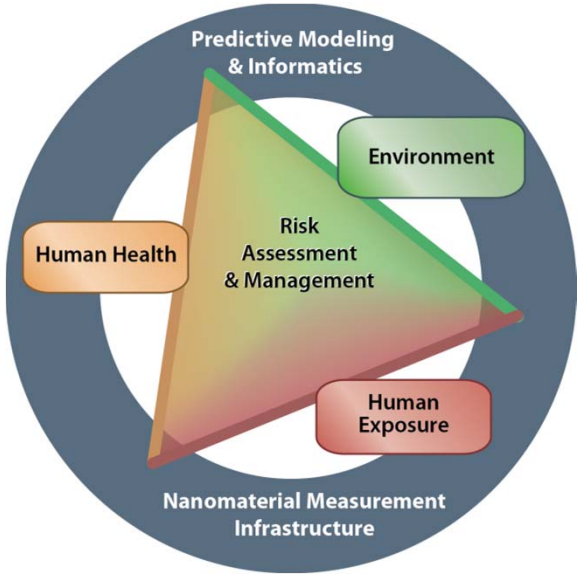
2011 NNI Environment, Health, and Safety Research Strategy



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NATIONAL NANOTECHNOLOGY INITIATIVE

What is the National Nanotechnology Initiative?

NNI Organizational Structure

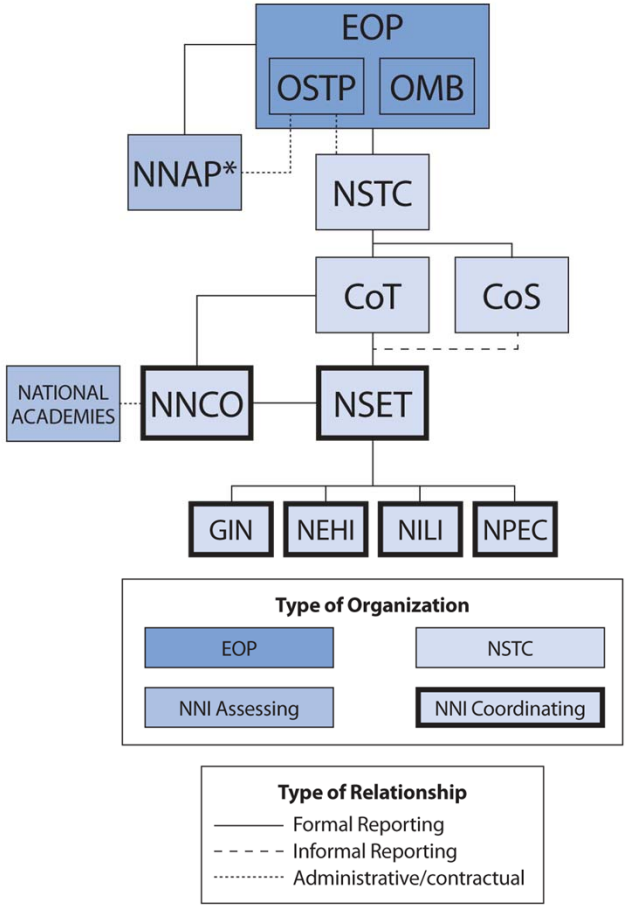
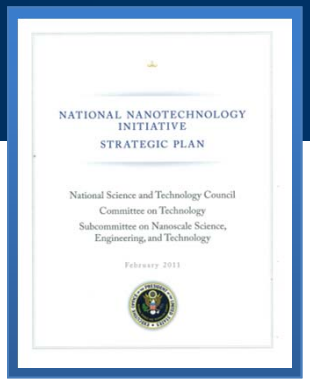


Figure 2. Coordination and Assessment of the NNI

**Executive order 13349 designates the President's Council of Advisors on Science and Technology (PCAST) as the National Nanotechnology Advisory Panel (NNAP).*

2011 NNI Strategic Plan



Vision

- A future in which the ability to understand and control matter on the nanoscale leads to a revolution in technology and industry that benefits society.

Goals

- Advance world-class nanotechnology research and development
- Foster the transfer of new technologies into products for commercial and public benefit
- Develop and sustain educational resources, a skilled workforce, and the supporting infrastructure and tools to advance nanotechnology
- Support responsible development of nanotechnology

Outcome

- Informs and influences the Federal budget and planning processes through its member agencies
- Three to five year objectives (new in 2011)

Goal 4: Responsible Development of Nanotechnology

2011 NNI Environmental, Health, and Safety Research Strategy

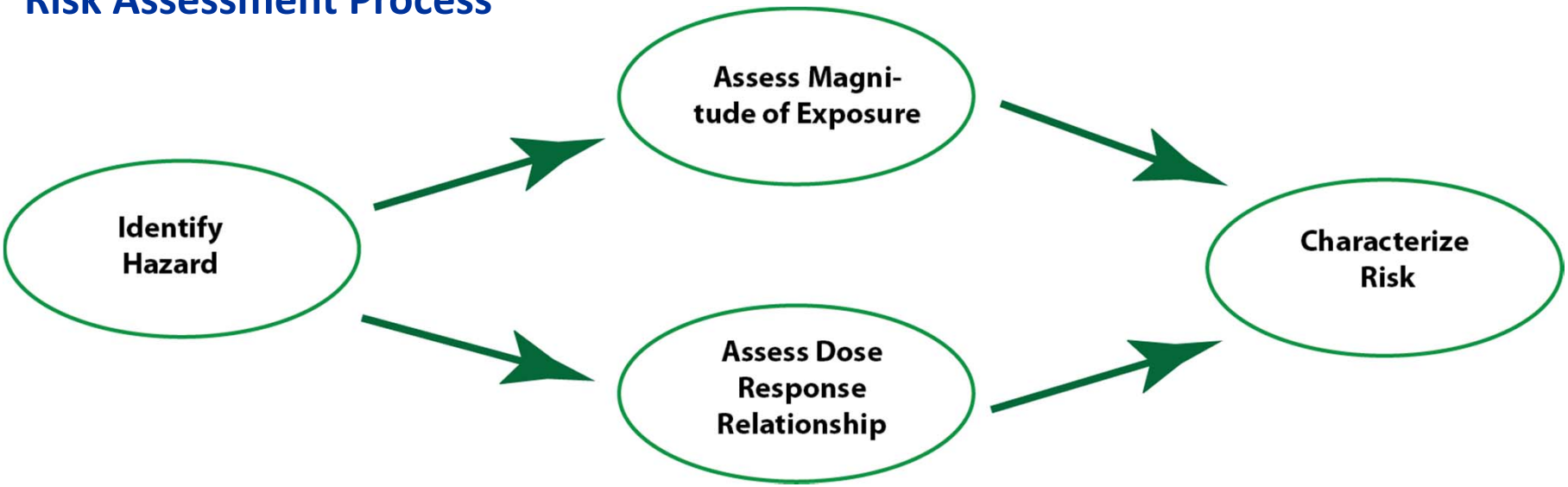
Mission:

- Protect public health and the environment
- Employ science-based risk analysis and risk management
- Foster technological advancements that benefit society

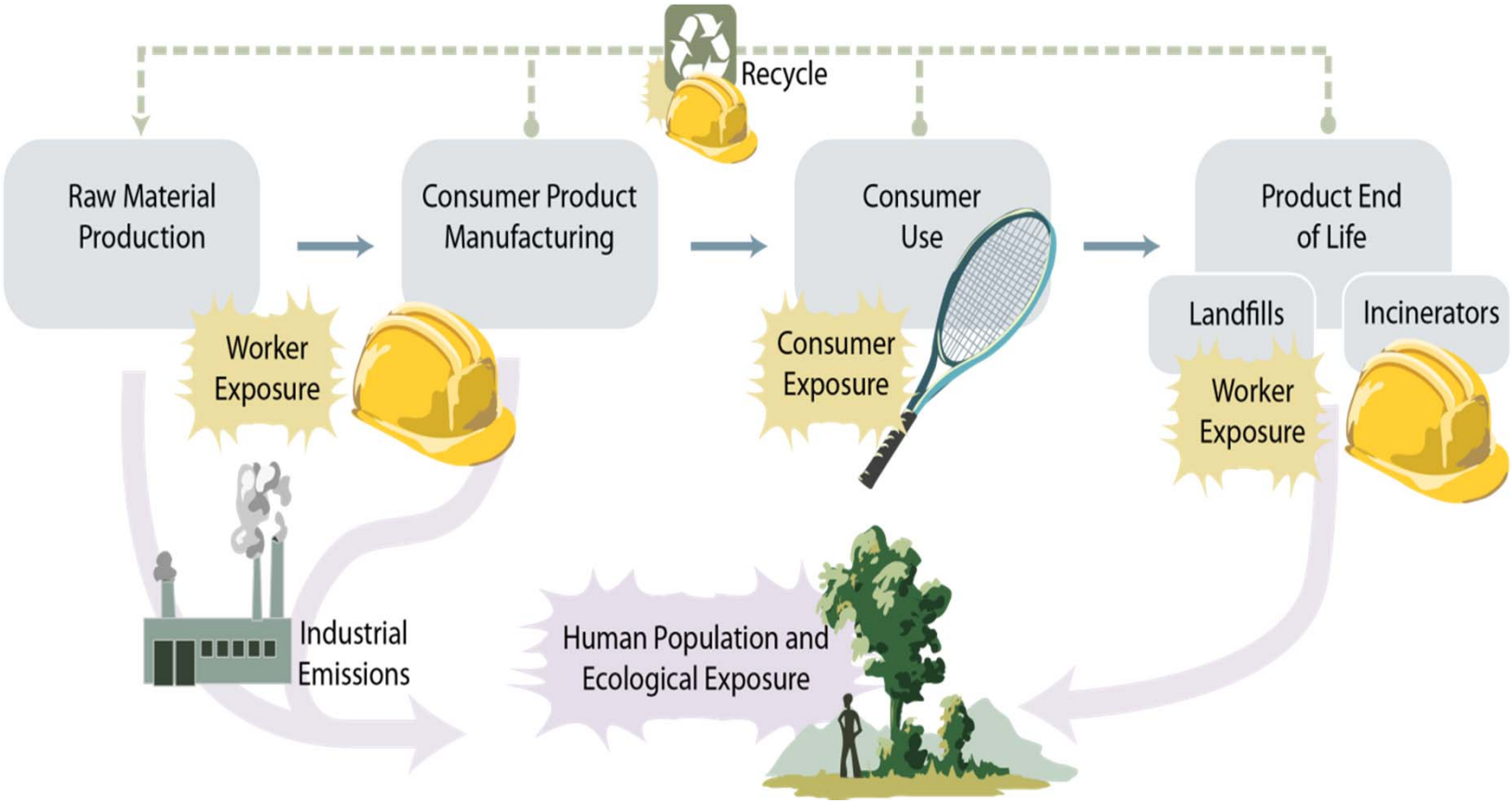
Nanotechnology Health Implications Working Group

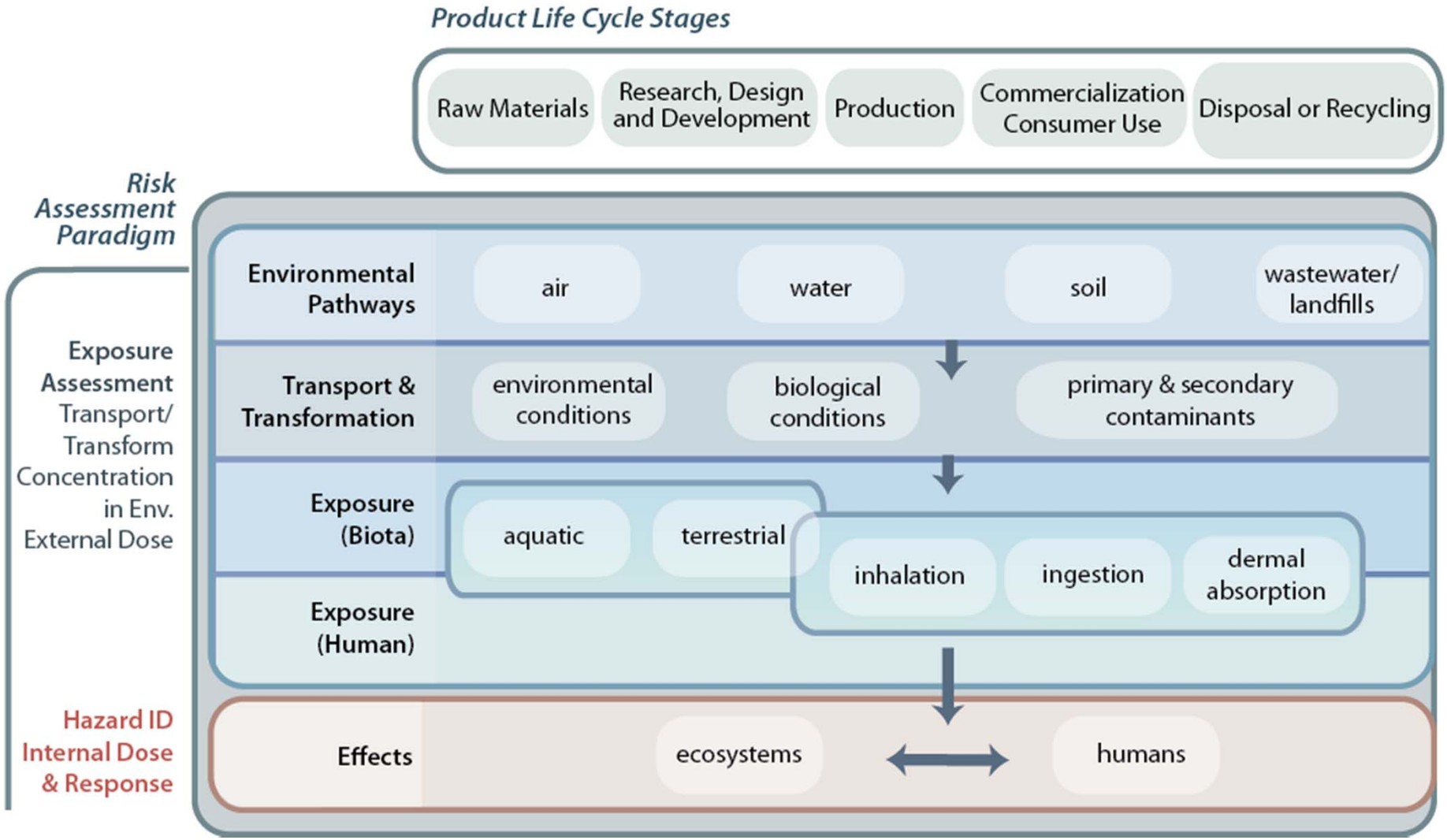
Framing the Research Strategy

Risk Assessment Process

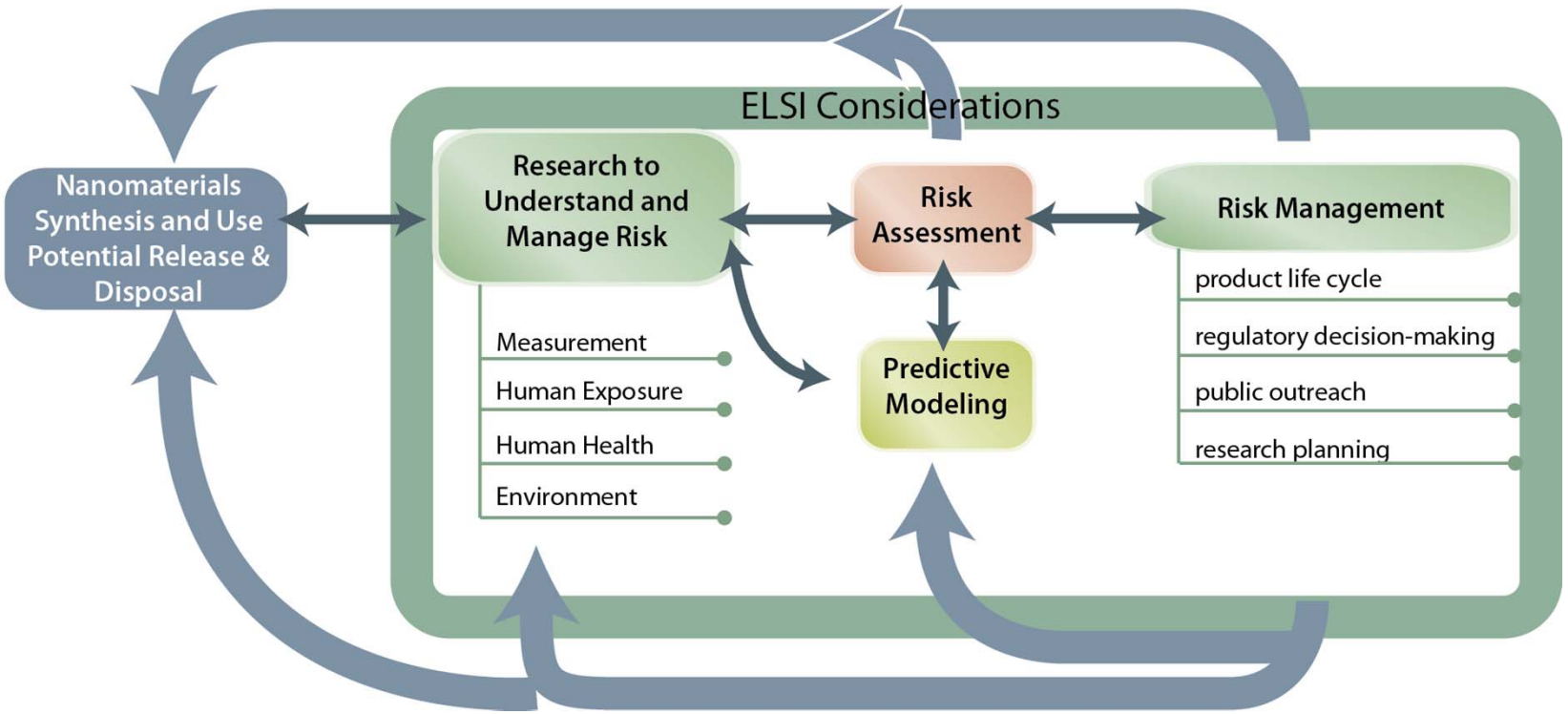


Life Cycle Stages




Product Life Cycle Stages
Raw Materials
Research, Design and Development
Production
Commercialization Consumer Use
Disposal or Recycling
Risk Assessment Paradigm
Exposure Assessment Transport/ Transform Concentration in Env. External Dose
Hazard ID Internal Dose & Response
Environmental Pathways
air
water
soil
wastewater/ landfills
Transport & Transformation
environmental conditions
biological conditions
primary & secondary contaminants
Exposure (Biota)
aquatic
terrestrial
Exposure (Human)
inhalation
ingestion
dermal absorption
Effects
ecosystems
humans

Risk Management Research Framework

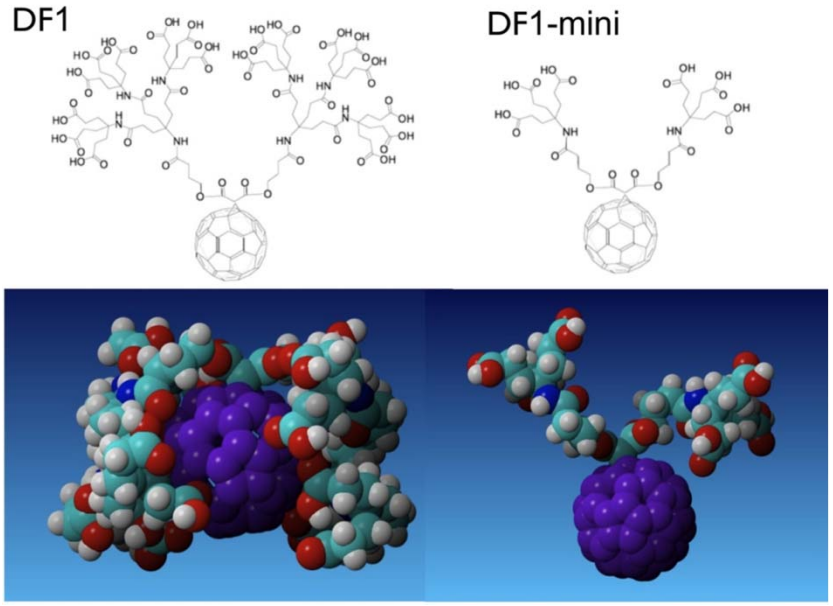


Informatics and Modeling for NanoEHS Research

- Aid development, analysis, organization, archiving, sharing, and use of data that is acquired in nanoEHS research projects in the core research.
- Effectively manage reliable, high-quality data to support advanced modeling and simulation.

- Sections:
  - Data acquisition, analysis, sharing
  - Structural models
  - Predictive models and simulations
  - Collaborative informatics infrastructure

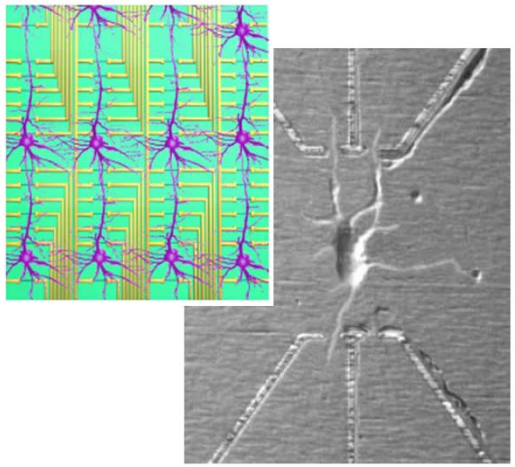
  - New research need



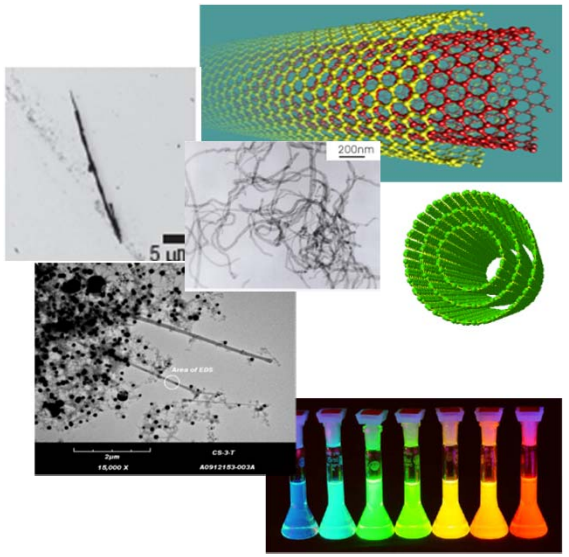
Targeting and Accelerating Research

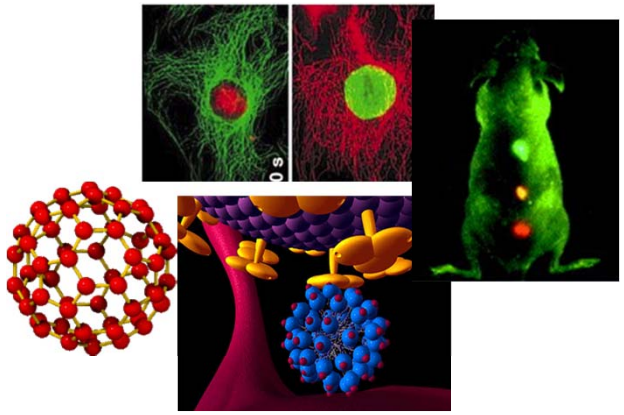
- Prioritize which nanomaterials to research
- Establish standard measurements, terminology, and nomenclature
- Maximize data quality
- Stratify knowledge for risk assessment
- Partner to achieve the NNI EHS research goals
- Engage internationally

Prioritizing Nanomaterials for Research



- Potential for hazard
- Likelihood of exposure
- High reactivity
- Biological novelty
- Identified in a health or environmental event



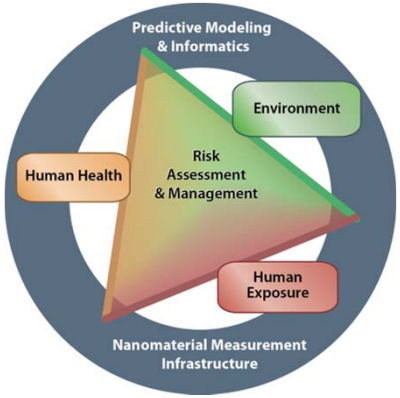


Alignment between Goals and Objectives of the NNI Strategic Plan and the NNI EHS Research Strategy

NNI Strategic Plan Objective 4.1.1.1:	NNI EHS Research Strategy Goals:	Explanation of the Relationship:
Incorporate safety evaluation of nanomaterials into the product life cycle, foster responsible development, and, where appropriate, sustainability across the nanotechnology innovation pipeline, by *developing and applying measurement tools (defined as protocols, standards, models, data, and instruments) to assess the physico-chemical properties of engineered nanoscale materials (ENMs) and their biological effects in the environment and on human health and quantify exposure across the nanotechnology product life cycle*.	■ Develop measurement tools for determination of physico-chemical properties of engineered nanoscale materials in relevant media and in products ■ Develop measurement tools for determination of biological response, and to enable assessment of hazards and exposure for humans and the environment from engineered nanomaterials and nanotechnology-based products throughout all stages of their life cycles ■ Understand the relationship of physico-chemical properties of engineered nanoscale materials to *in vivo* physico-chemical properties and biological response. ■ Identify, characterize, and quantify exposures of workers, the general public and consumers to nanomaterials. ■ Understand the environmental fate, exposure, and ecological effects of engineered nanomaterials.	*The NNI Strategic Plan objective 4.1.1.1 maps directly to the goals and research needs articulated in the NNI EHS research strategy. The Nanomaterial Measurement Infrastructure (NMI) goals direct development of measurement tools to determine the physico-chemical properties of ENMs in relevant media and in NEP and for the biological response across the ENM and NEP life cycles. The NMI research needs specify the types of assays and measurement tools necessary to achieve the NMI goals, and the resulting tools are applied in the human exposure assessment, human health, and environment categories to make the quantitative measurements of exposure and biological effect. Quantitative measures of exposure are also consistent with the human exposure assessment goal to identify, characterize, and quantify exposures of workers, the general public, and consumers to nanomaterials.*

NNI Strategic Plan Goal 4 objectives are laid out in the *National Nanotechnology Initiative Strategic Plan 2010* (NSET/NSTC, Washington, DC, 2010; forthcoming) pp. 24–26.

2011 NNI Environment, Health, and Safety Research Strategy



Draft document available at: http://strategy.nano.gov/

More information on the NNI: nano.gov